

CASE STUDY

Letterkenny Army Depot: The Army Teaches Business a Lesson in Lean Six Sigma

By

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Note to the Reader

This case is both a research case and an issue-based case on the subject of leading change and implementing Lean Six Sigma (L6σ). As a research case, it describes how the Commander, senior leaders, and frontline employees used L6σ to save Letterkenny Army Depot from closure. The research segment of the case also pairs the depot Commander's approach to leading change with published frameworks for leading change in business organizations. The research case is formatted in the columns.

As an issue-based or decision case, the setting might be an administrative or service function in the military or a business organization. The overarching issue in the case: can the lessons learned from Letterkenny Army depot – a manufacturing facility – be applied to leading change in an administrative/service organization. The issue-based segment of the case is formatted in blue text boxes and raises issues in the context of the research case.

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ABSTRACT

Letterkenny Army Depot: The Army Teaches Business a Lesson in Lean Six Sigma is a case study of Letterkenny Army Depot, one of five Army maintenance depots. Letterkenny recapitalizes missiles, HMMWV's, generators, and other equipment for the United States Army. Recapitalizing equipment means completely disassembling the system, cleaning and/or replacing every component, subcomponent and part, and reassembling and testing the equipment.

Col. William Guinn was assigned as depot commander in July 2002 only to find the depot was in deep financial and operational trouble. Letterkenny had ...

- experienced an operating loss of \$31 million on revenues of \$120 million
- work flows that were dysfunctional and inefficient
- the highest hourly wage rates among all the depots
- an infrastructure that was badly in need of repair

Additionally, the depot faced possible closing by the Base Realignment and Closure (BRAC) Commission in 2005.

This case documents Col. Guinn's Lean Six Sigma deployment at Letterkenny Army Depot from 2002 to 2005. Using the principles and tools of Lean, Letterkenny's commander, senior leaders, managers, and employees successfully transformed the depot from the Army's worst to its best performing depot in terms of productivity and cost efficiency. Three years after the depot's Lean journey began, the 2005 BRAC Commission not only recommended keeping Letterkenny open, but also assigned it additional programs. In the same year, Letterkenny won the public sector Shingo Prize for applying Lean to its Patriot Missile recapitalization program.

The authors use a framework developed by Michael George in his book *Lean Six Sigma for Service* to present the results of their research. In addition to being a research case (i.e., a descriptive case), the case raises issues on deploying Lean Six Sigma – issues that can be addressed in business and military educational settings. *Letterkenny Army Depot: The Army Teaches Business a Lesson in Lean Six Sigma* is case about Lean Six Sigma, leading change, and business transformation.

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Prologue

THEN:

Colonel William Guinn assumed command of Letterkenny Army Depot on July 18, 2002. Upon his arrival, Col. Guinn's deputy, Dr. John Gray, didn't hand him the usual *Review & Assessment Report*; there wasn't one – previous depot leaders hadn't prepared one. Even without a formal report, Col. Guinn knew things weren't well at Letterkenny, but in reflecting back on his first day at Letterkenny, "I didn't know how bad things really were until my escort casually informed me that he knew why I had been assigned to the depot – to shut it down, he told me."

It took Col. Guinn only a few days to identify the major issues facing the depot:

- an operating loss of \$31 million on revenues of \$120 million, primarily due to accounting changes
- work flows that were dysfunctional and inefficient
- the highest hourly wage rates among all the depots
- an infrastructure that was badly in need of repair

Col. Guinn's opening comment at his first Directorate meeting: "I would be doing the Army and the American taxpayers a favor by closing this depot... I would be putting this place out of its misery... It would be a mercy killing and no one would court martial me for doing it."

As if this statement wasn't frightening enough, everyone sitting around the table knew that Letterkenny would be facing another "mercy killing" in three years: the 2005 Base Realignment and Closure (BRAC) Commission.¹ Not much of a choice said one Director, "immediate death or a slow death over the next three years."

Col. Guinn was keenly aware of the potential impact on Letterkenny of BRAC: the loss of more than 1800 jobs -- jobs paying an average of \$46,000, the highest in the area; the negative economic impact on Chambersburg and the county; and the expense to the Army of relocating the work being done at Letterkenny and of closing the depot. Letterkenny had already been BRAC'd in 1995, after which 1200 jobs were eliminated and 1,450 acres were turned over to the Letterkenny Industrial Development Authority for private development. Rather than bite the economic bullet and make Letterkenny a more cost-efficient depot, Letterkenny and community leaders in 1995 took the political road to Washington to lobby to keep the depot whole and intact. The political strategy failed miserably -- the depot was chopped in half by the BRAC Commission.

¹ BRAC is a Congressionally authorized process that the Department of Defense has used to reorganize its base structure. BRAC recommendations frequently involve closing or substantially downsizing depots and other military facilities.

Col. Guinn knew that if Letterkenny could not economically compete with the Army's other depots and private contractors, it faced substantial downsizing in 2005, or even worse, closure. But contrary to popular belief, Col. Guinn hadn't come to close Letterkenny. He concluded his first Directorate meeting by stating, "I took this assignment to make Letterkenny the most cost-efficient depot in the Army; I have never retreated, I have never surrendered; I'm here to fight for the survival of Letterkenny. And here is my plan to accomplish the mission..."

Now:

Fast forward the clock three years to October 5, 2005, (ret) Col. Guinn, now former Commander of the Letterkenny Army Depot, is guest of honor at the Shingo Award ceremony. Letterkenny was one of four winners of the Public Sector Shingo Prize.

The Shingo Prize for Excellence in Manufacturing was established in 1988 to promote excellence in manufacturing. The achievements and recognition of the Prize was cited by *Business Week* as "the Nobel prize of manufacturing...." In 2005, a new category for the Shingo Prize was defined: a Public Sector Prize. The Shingo Public Sector Prize was established to "recognize entities in the United States that have demonstrated outstanding achievements in manufacturing/MRO (Maintenance, Repair and Operations) and the supporting business processes leading to outstanding quality, cost, delivery, and business/financial results."

Not only had Letterkenny won the Shingo Public Sector Prize, it had survived BRAC and more. The BRAC proposal called for a transfer of 150 - 200 jobs to Letterkenny from bases in Red River, Texas; Rock Island, Illinois; and Barstow, California. According to Dr. Gray, "We are eyeing construction of a new \$1 million facility in the depot's ammunition area to house missile repair work slated to transfer to Letterkenny."

The *Chambersburg Public Opinion*, the local newspaper, bannered the following headlines on February 15, 2006: "Army Brass Lauds Depot Manufacturing." While attending Shingo Prize celebration ceremonies at Letterkenny Army Depot, Gen. James Pillsbury, Commander of Army Aviation and Missile Command, spoke to the men and women who worked on the PATRIOT missile system:

Let me tell you something, this is a big deal. This is a big deal. This is the first time a public sector Army depot has won a Shingo Award. You have taken the PATRIOT, the most complicated war system the Army has, and fixed it... A person's importance can't be judged by how close he or she is to the front line. You all are just as important to the strategic mission of the Army as anybody else. You do it better. You do it better every day. I couldn't be prouder to be part of the team.

Can it get any better than the Shingo Prize? Not for Letterkenny, but it did for Col. Guinn. Recognizing the contribution that Col. Guinn made in keeping Letterkenny alive and well in his district, U.S. Rep. Bill Shuster featured a photo of Col. Guinn and himself on the Congressman's Christmas card. Col. Guinn received recognition by the Shingo Prize Committee and Congressman Shuster for his contribution to the Army and the district. As one of Col. Guinn's colleagues remarked, "the Shingo Prize – a great award; your photo on a Congressman's Christmas card – priceless."

BACKGROUND

Letterkenny Army Depot (LEAD), one of five Army maintenance depots, is a government-owned, government-operated installation located in south central Pennsylvania, near Chambersburg. Letterkenny is known for its unique tactical missile repair capabilities including the complete refurbishing of PATRIOT missile system's associated ground support and radar equipment.

Most recently, Letterkenny expanded its service capabilities to overhauling tactical wheeled vehicles (HMMWV's), material handling equipment (7.5 Ton Cranes), generators, and Mobile Kitchen Trailers. Financially, Letterkenny's annual operating budget was \$372 million in 2005 with an annual payroll of \$130 million and local procurement totaling \$35 million.

Among its many tasks, Letterkenny totally recapitalizes PATRIOT Missile Air Defense Systems. Recapitalizing a system means completely disassembling the system, cleaning and/or replacing every component, subcomponent and part, and reassembling and testing the system. When a system is "recapped," it is considered as good as or better than new – zero miles and zero hours. A PATRIOT battery consists of up to forty launchers, a radar unit, control station unit, information and coordination unit, communications relay unit, antenna mast unit, and power generating equipment. Letterkenny was tasked in 2002 with recapping all the PATRIOT Missile Air Defense units at a rate of one battalion per year until 2010.

Letterkenny Industrial Complex

18,864 Acres, 2.2 Million Labor Hours, Approx 1 Million Sq Ft of Shop Floor
1313 Gov't Employees, 711 Contract/Military, 699 Tenants & Contractors = 2,723 people

The organizational structure of Letterkenny is similar to a medium size division of a multinational corporation. The Depot Commander is equivalent to a division CEO or general manager; his Deputy, a civilian, to a COO. The Deputy offers an Army depot continuity because Commanders are typically rotated in and out of a position every two years. Exhibit I shows Letterkenny's organization chart. The Directorate level

is similar to the Vice President level in a corporate organization.

One Directorate deserves special note because it is not what the name implies. The Directorate of Maintenance is similar to the production function in a manufacturing company; it is not the directorate for building or land maintenance. All production-like functions at Letterkenny come under the Directorate of Maintenance because the depot's mission is maintenance: all the

recapping and repair shops, production, production engineering and control – anyone who turns a wrench is under the Directorate of Maintenance. There were 700 people reporting to the Director of Maintenance in 2002. Most of the L6σ events occurred within this Directorate.

The Depot Commander reports to the Commander of the Army Aviation and Missile Command – one of eleven subordinate commands of the Army's Army Materiel Command. The Army Materiel Command directs the activities of depots, arsenals, ammunition plants, laboratories, test activities, and

procurement operations. In 2002, the Army Materiel Command had a budget of \$20-plus Billion and employed over 60,000 military, civilian, and contractor personnel, as well as managing inventory valued at over \$7 Billion. In terms of size, it ranks with the top 10 corporations in the country. Letterkenny with an annual operating budget of \$220 million was a small part of the Army Materiel Command's overall operations, but a critical one in terms of maintaining the most complex war system the Army fields.

CHANGE OF COMMAND

Col. William A. Guinn arrived at Letterkenny in July 2002, less than a year after 9-11 and the invasion of Afghanistan. The nation was at war – there was no lack of work at Army depots. So Letterkenny wasn't facing a demand problem - their problem was low productivity and high cost. At Army Materiel Command headquarters, Letterkenny was placed at the very bottom of the list of depots and installations in terms of cost and productivity. Gen. Paul Kern, Army Materiel Command Commander at the time, believed Letterkenny would be the first Army installation to be BRAC'd in 2005. Col. Guinn had been assigned to a losing battle.

Col. Guinn joined the Army as an enlisted man, became commissioned and rose through the ranks on the operational-side of the Army. He attended the Army's command schools and colleges. The closest Col. Guinn came to learning about managing costs

and productivity in a manufacturing operation was a Master's Degree in Industrial Relations from Iowa State University and a Masters of Science Degree from the Industrial College of the Armed Forces. His assignment to Letterkenny Army Depot was cranked-out by the Army's personnel system. Col. Guinn had a good record on the operational-side of the Army, experience commanding and leading soldiers, but no training or experience in turning around a manufacturing operation or leading a L6σ mission. At the time, there was no Depot Commanders' school for the management of Army depots or installations. So who planted the seed of L6σ for the business side of the Army?

Six months earlier Gen. Kern had embraced L6σ after a reserve lieutenant at Red River Army Depot implemented L6σ on a vehicle recap production line. The reservist told Gen. Kern that he learned L6σ by reading a book by James Womack. Gen. Kern bought the book –

James P. Womack's and Daniel T. Jones's book *Lean Thinking*² – read it and became a “believer.” He retained the Simpler Corporation as a L6σ consultant to the Army, and offered their L6σ consulting services to the depots. According to Gen. Kern, “Letterkenny never got on board with L6σ.” After approving Col. Guinn's assignment to Letterkenny, Gen. Kern suggested to Col. Guinn “that he read Womack's book and contact Simpler.”

Col. Guinn followed orders. But what happened next were not orders; Col. Guinn discovered a new religion – L6σ. To say that he “just got religion” would be an understatement. He would embrace the concepts and tools of L6σ as the foundation of his management philosophy and practice. In his view, L6σ could turn around Letterkenny. He became convinced L6σ could save Letterkenny from being BRAC'd in 2005.

Even though Col. Guinn believed L6σ could turn around Letterkenny, his challenge was convincing 1,000 employees – his Deputy, Directors, Chiefs, supervisors, union officers, and frontline employees – that L6σ would keep Letterkenny alive. He knew he had the support of Gen. Kern. But three years to BRAC... how was he going to implement L6σ and achieve the benefits of Lean before 2005? In August, 2002 Col. Guinn defined his vision: “to go to BRAC in 2005 with the most efficient depot in the Army.” Letterkenny would never again be at the bottom of the Army Materiel Command's performance list.

² James P. Womack & Daniel T. Jones, *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, Revised and updated, Free Press, 1996, 2003.

Discussion Issues

The Army personnel system assigned a new commander to Letterkenny without considering the depot's requirements or the commander's core competencies. A commanding officer approved but did not select his new depot commander. How should the Army or a company match needs with capability? What capabilities are essential for successfully leading change in complex organizations? How do these questions and your answers change in a service organization? How does your organization address these issues? What does the Army's current system emphasize instead, and why?

FRAMEWORK FOR DEPLOYING LEAN SIX SIGMA

Michael George devotes Part II of his book *Lean Six Sigma for Service* to L6σ deployment.³ George derived his L6σ deployment phases from four successful business and government implementations of L6σ reported earlier in his book. This section of the case will match Michael George's "Phases for Deploying Lean Six Sigma" with Col. Guinn's approach to implementing L6σ at Letterkenny Army Depot.

George proposes that a L6σ deployment occurs in four phases:

1. *Readiness Assessment* -- select a L6σ Champion, establish a baseline snapshot of the organization, interview top management, engage key influencers, and assess the impact of what you've discovered.
2. *Engagement* -- create a clear burning platform, reveal how people's lives will be different, and change management meeting agendas.
3. *Mobilization* -- commission an executive team, create the infrastructure, train, define first-wave projects, and define metrics.
4. *Performance and Control* -- plan ahead for the benefits, change management structure, and avoid the pitfalls of L6σ deceleration.

George's four phase deployment framework will be overlaid below onto the history of the L6σ implementation at Letterkenny.

³ Michael L. George, *Lean Six Sigma for Service*, McGraw-Hill, 2003. pp 185 – 252.

This phase of Michael George's deployment framework is not unlike approaching a railroad crossing – stop, look, listen – before crossing the tracks or in this case, before rolling the L6σ locomotive down the tracks. A sitting CEO would first *stop* business as usual, but Col. Guinn hadn't started yet so there was nothing to *stop*. But he did *look* and *listen*. He *looked* by walking the shop floor and *listened* by asking for reports and scheduling briefings. This all happened within a month of the Commander's arrival.

The first report Col. Guinn directed was a Review and Analysis (R&A) report – a quarterly report prepared at Army depots and installations detailing the status and progress of Directorates (i.e., departments or functions in a business organization) toward organizational goals. The R&A report would have satisfied George's recommendation of establishing a baseline snapshot of an organization. As it turned-out, recent quarterly R&A's had not been prepared at Letterkenny; consequently, it was impossible for the new Commander to know how bad things really were. Col. Guinn scheduled a meeting of Directors "to figure out what was going on." Col. Guinn remembers the briefing as "five hours of meaningless numbers." He received no answers to questions like "how long does it take to hire a new employee... how long does it take to process a change slip... how many actual hours to recap a launcher... what is the total repair cost for a missile sub-assembly?" He knew that he and everyone else in the room had to have answers to these types of questions before a process or activity could be

improved or targeted for improvement. The Commander also knew it would be hard to define metrics for some processes in the depot, but it had to be done. If you can't measure it, you can't control it. How can we be "quicker—cheaper—better" if we don't measure time, dollars and rejects?

Letterkenny senior leaders and Directors were directed by the Commander to re-define performance measures for their areas. It took several months and many iterations to define the "right" metrics. Balanced Score Cards were as popular in the Army then as they are now, but Col. Guinn avoided them for the whole depot and for individual Directorates. He believed Army Score Card standards were set far too low, leading to a sense of accomplishment when none existed. The metrics his Directors were to use would be cardinal and trackable from period-to-period. Direction-of-change and rate-of-change were to be measured. No scores for the Directors at Letterkenny—just hard numbers showing continuous improvement. The scoreboard for the new game in town had been defined. And following the guidelines of L6σ, the scores were going to be visible to all and be posted throughout the depot.

Col. Guinn also announced that his focus was going to be Lean rather than Six Sigma. In his opinion, a process has to be leaned before quality can be addressed or before sophisticated information systems can be applied. Letterkenny already had a Directorate of Product Assurance engaged in Six Sigma. *Better* was not the problem at Letterkenny – the burning need was productivity improvement and cost

reduction. So during the Readiness phase, it was the *Lean* in L6σ that was to be implemented, managed and measured.

As it turned out, the Product Assurance area provided the Commander with more than just quality control. While walking the shop floor, Col. Guinn asked an Industrial Engineer from the Production Engineering Division what he was doing on a HMMWV production line and what his background was. Steve Miller introduced himself as a West Point graduate with a Masters Degree in Business Administration, serving 5 years in the military, and then 10 years in industry as a process and manufacturing engineer. As a process engineer for a hot glass production automotive supply Original Equipment Manufacturer and later as a senior manufacturing engineer for a mobile hydraulic crane materials handling company, Miller had learned the Toyota Production System. He came to Letterkenny shortly after the 1992 BRAC to do process improvement work in anticipation of the next BRAC in 1995. He brought with him 8 years of experience in L6σ and an extensive library of books on the subject. Prior to 2002; there was a different philosophy of process improvement. Early on Miller was pulled-aside and told to slow down on efficiency improvements; he was told that his job was to focus on developing projects to spend money to expand capacity and capabilities, not to save money by cutting production labor hours on existing money making programs such as PATRIOT. He put his L6σ books in boxes; they stayed in boxes, even after Letterkenny was BRAC'd in 1995, until Col. Guinn asked him to be his Lean Champion in autumn of 2002. The Commander had a Lean Champion.

Michael George's readiness assessment involves uncovering factors that will shape deployment plans: staff experiences with past change initiatives; understanding organizational strategy and priorities; how decisions are made and conflict resolved; what people consider key to their successes within an organization; and how work gets done (collaboration versus silos). As shown in Exhibit II, the command staff prepared, published, and communicated a Strategic Business Plan that addressed topics such as philosophy (customer focus, management by measurement, improve all we do); vision (world class ...); mission (sustain operating forces); and objectives (quality, improve operations, support Army transformation). L6σ as the new management practice on the depot was also communicated in newsletters and through open meetings with Directors, who in turn cascaded the L6σ message to their Chiefs and to frontline employees. Starting with this phase, and in every phase of George's L6σ deployment cycle, Col. Guinn used all internal communications media available to him and even the local newspapers to inform all Letterkenny stakeholders about the depot's deployment of L6σ. The groundwork was being laid to move from the *Readiness* phase to the *Engagement* phase. (In later phases, Col. Guinn even more vigorously advertised the successes the depot was having with L6σ.)

But was the emphasis on open communication and publicity necessary at this early phase of the deployment initiative?

The answer was YES. Not surprisingly, Col. Guinn's L6σ initiative was greeted as "just another Army improvement program." As one

Director put it, “We had quality circles, process engineering, value engineering, and on and on... we had heard it all before – this was just another flavor-of-the-month improvement program in our minds. We knew Guinn would be gone in two years, and someone else would come along with their improvement program.” Even Col. Guinn’s deputy was skeptical at first: “You know, we don’t have to do this; Gen. Kern will be gone in a year or two, and all this L6σ stuff will be forgotten.” Responding to a question of when she believed L6σ was going to be permanent fixture at Letterkenny, the Directorate of Maintenance replied: “When I saw Col. Guinn and his deputy actually participate in L6σ events, I knew it was for real when I realized they were walking the talk. Before that, I thought it was all talk.”

The other steps outlined by George for the *Readiness Assessment* Phase –

understanding the organization’s decision style (collaborative or silo) and employees’ personal keys to success, and engaging key influencers – will find a better fit in George’s later phases of Letterkenny’s L6σ deployment.

The *Readiness Assessment* Phase lasted only a month for Col. Guinn. It didn’t take long to assess the efficiency of the production function at Letterkenny, the metrics of the score keeping system, or the attitude toward change. Col. Guinn concluded that “the employees want to do a good job – people at Letterkenny didn’t come to work to do a lousy job... they wanted to be productive. The problem wasn’t the people; as Deming would say, it’s the system.” His assessment completed, the battle for change was about to begin. It was time for *Engagement*.

Discussion Issues – The Case

What more could the depot commander have done to assess the readiness of the depot for change?

The commander was new to the depot. How could he have identified key influencers in the organization and engaged them for the pending changes?

How can Balanced Scorecard targets be calibrated to goals with both reach and realism?

Discussion Issues – Your Organization

What are the characteristics of an effective L6 σ Champion? Discuss selecting a Champion candidate, one having in-depth training and experience in L6 σ but little knowledge of your organization, versus a candidate from within your organization with no L6 σ background.

In the context of a pending L6 σ deployment in your organization, what critical success factors would you include in a baseline snapshot of your organization?

We all know the key influencers in our organization. How would you go about bringing them on board the L6 σ train? How do these questions and your answers change for a service organization?

Rapid improvement events in L6 σ often leads to changed work practices for a union-represented workforce. Letterkenny experienced no labor-management difficulties in changing work practices. If your organization employs union-represented labor, how would you gain union acceptance of L6 σ ?

Are Balanced Scorecards used in your organization? If YES, what Balance Scorecard performance measures are currently used? If NO, should they be used in your organization? How would performance measures change before, during, and after a L6 σ deployment?

Phase II: *ENGAGEMENT*

Michael George subtitles this phase “creating pull.” He introduces the *Engagement* phase with the statement: “One of the fundamental secrets of success is publicizing the link of Lean

Six Sigma to business strategy.” Among the many management practices the business side of the Army does well is to link mission, vision, objectives, strategy, and goals. The Army takes the “link” a

step deeper into the organization through a framework called the “Mission Essential Tasks List” or METL.

METL is a framework designed to cascade objectives, strategy, and goals from the top of the Army down through all levels of personnel. It is an active link between all the words and charts at top command levels and execution on the factory floor or in support offices. METL, in the format of a matrix, assigns primary and secondary accountability down to all levels of the organization and to those people responsible for carrying out locally defined initiatives – initiatives which in turn led to accomplishing the organization’s overall objectives and goals.

The Letterkenny initiatives, as identified by Col. Guinn and his senior staff, are shown in Exhibit II. The Letterkenny METL matrix in Exhibit III linked the business side of the Army’s strategic objectives to Letterkenny’s supporting goals, and then assigned responsibilities for accomplishing those goals to each Directorate. Performance measures were assigned to each Goal/Directorate intersection and tracked over time. Although Exhibit III is presented as a static exhibit, when performance measures are tracked over time, METL becomes a dynamic management tool as it color codes “progress toward goal accomplishment.” At weekly meetings of senior leaders and Directors, those Goal/Directorate intersections colored yellow or red received directed attention and, if necessary, additional resources.

Col. Guinn, senior leaders, and Directors put in place the paper-side of successfully managing change. But this wasn’t engagement as the Army would define it, nor is it the way Michael

George defines engagement. Not enough action! The real action started in August 2002 as the “rules of engagement” were defined.

George proposes three “rules of engagement” for deploying L6σ:

1. identify a clear *burning platform*
2. create a concrete picture of how people’s lives will be different
3. change meeting agendas

The “clear burning platform” had been set for Letterkenny by the 1995 BRAC and the approaching 2005 BRAC. As stated in the Prologue, it was simply to get better at what they were doing, or die. The engagement plan: to become the highest productivity and lowest cost depot, or die.

Even with BRAC as a burning platform, Col. Guinn still had to convince an aging workforce (average age 51), one group ready for early retirement, and another group who, given the option of keeping their job or a severance check of \$25,000, would take the check and leave. As one employee remarked, “BRAC would have meant a new pickup truck for me.”

How do you deal with “attitude” and employee resistance to change? Letterkenny’s senior leaders dealt with this issue during the *Mobilization* phase, as we will see in the next section.

George’s next rule of engagement – creating a concrete picture of how people’s lives will change – was a matter of moving people out of their safe zones. As a soldier and a commander, Col. Guinn knew the question in everyone’s mind was “what’s in it for me?” What Col. Guinn did was rephrase the question in the minds of everyone from the top leadership to frontline

employees. Each of his rephrased questions came from different sources. His first question came directly from L6σ principles and practices: “What’s in it for the customer”? His second question came from the Army pathos: “What can we do that will make life better for the soldier”?

Customers were invited to Letterkenny, sometimes to live near the depot for extended periods of time, in order to specify exactly what they wanted. For example, members of the Army’s Special Forces team worked with Letterkenny engineers and shop people in re-designing standard HMMWV’s to meet their special requirements. The customer was asked to specify the finished product, the quality, the delivery time ... everything but the cost. Then if the product came in under cost, and it frequently did because of L6σ, the customer received a refund check for the savings. If an employee had to change a location or cross-train for a process to become more efficient, it was because it was good for the customer. Throughout the *Engagement* phase and into the two remaining stages, the focus of change was “doing it better for the customer.” It was not protecting turf; if was not business as usual, it was not staying in one’s safe zone. The Commander set the target – the customer – and everyone at Letterkenny was constantly reminded to keep the customer in their sights. And, of course, the *customer* was the *soldier*.

Col. Guinn also relied on the hard realities of war for redirecting focus away from “what’s in for me” concerns. People at Letterkenny were acutely aware of their importance to the war effort and their support of the soldier in the field. There were pictures of trucks blown apart by roadside bombs with

nothing left but the cab built and reinforced with armor by Letterkenny employees. There were letters from soldiers whose lives were saved by work done at Letterkenny. As one of the first-line supervisors expressed it, one who strongly resisted Lean changes to his area, “what was I supposed to say to the Colonel when he took me aside and said that I was going to be the one to write the letter to a mother who lost her son because we had the HMMWV that could have saved his life still in my [deleted] shop ... it wasn’t about me anymore.”

George’s third rule of engagement is changing meeting agendas. Directorate meetings were once a week. All Directors and senior leaders attended the meetings. Performance metrics for Directorates had already been changed. METL was used as a framework for progress toward goals and objects. Behind the color coded METL matrix was hard numbers and period-to-period percentage changes. A color was yellow or red because Directorates were not meeting hard-number objectives. As L6σ projects were implemented in the later deployment phases, results were reported in “cost – schedule – quality” metrics. Col. Guinn saw meetings that were based on L6σ metrics as a way of changing the culture at Letterkenny; as a way of embedding L6σ process improvement into the life blood of Letterkenny; and as a way of assuring that L6σ would survive after he left Letterkenny. Meetings wouldn’t change the culture of Letterkenny, but the content would. Meeting agendas based on L6σ results were an important way of communicating what management priorities were at Letterkenny.

The *Engagement* phase and the *Mobilization* phase overlapped at Letterkenny. The phases were not

sequential – they moved in parallel. The period was August–September, 2002; less than three months after the change in command. The change clock was ticking... the build-up for operation Iraqi

Freedom had started... Col. Guinn had been in command for three months. Time to *mobilize* Letterkenny.

Discussion Issues – The Case

The time-line for the *Engagement* phase was extremely short at Letterkenny. What steps were overlooked by the commander and senior leaders that could have removed obstacles to change... that could have removed reasons to resist L6σ... that could have dealt with the “what’s in it for me” factor (WIIFM)? What factors should have determined the L6σ *Engagement* time-line at Letterkenny? How long should have been the commander’s *Engagement* time-line?

Discussion Issues – Your Organization

Prepare a time-line for the *Engagement* phase of L6σ in your organization. Annotate the time-line with activities and events.

Vision – mission – goals – etc. statements are valuable at the top levels of a large organization. What is their value in your organization, especially if you are far down the organization ladder? If you believe your organization should draft such statements, what should be their content?

What is the clear burning platform for change in your organization? Is the threat of a budget cut a “clear burning platform” for deploying L6σ? Why shouldn’t L6σ be used as a workforce reduction plan; after all, it is called “Lean” Six Sigma? How do you sell L6σ to an organization with no chance for new business (e.g., a service organization or a market-restricted company)? Should you?

When you deploy L6σ in your organization, how will people’s lives change? How do you handle the common situation where the lives of key influencers in your organization will change the most and often not for the better?

Other than discussing L6σ metrics, how else should your meeting agendas change? Consider the list of attendees for your current leadership meetings. How should the list change before and after deploying L6σ? Prepare an outline of a typical post-deployment L6σ meeting.

In your organization, should you Lean first or Six Sigma first? Given limited resources and the need for early successes, can you or should you do both simultaneously? Can you – and should you – achieve Six Sigma quality control on a non-Leaned process?

Phase III: *MOBILIZATION*

“A business initiative like Lean Six Sigma can reach its full potential in terms of both business results and resource deployment only when it is fully integrated into the regular

management structures and business flow of an organization. If not, it will eventually become isolated into silos or programs-du jour that fade away.”

Michael George, *Lean Six Sigma for Service*

Michael George proposed five goals for mobilizing an organization for L6σ deployment. The actions taken at Letterkenny to implement L6σ will be presented in terms of George’s goals.

Mobilization Goal #1: Commission an Executive Team to Oversee Deployment. Col. Guinn’s first act of mobilization was to establish an Office of Business Transformation. This top level office (see Exhibit I, Letterkenny Organization Chart) was assigned a dual mission: implement L6σ and develop new business. The rationale for the office was that L6σ would free people, space, and overhead resources. If Col. Guinn was going to stick to his announcement that L6σ wasn’t a workforce reduction plan, the freed-up capacity would have to be taken up with new business. Mark Sheffield was named Director of the Transformation Office; his responsibility – find new business.

The other new member of the Transformation Office was Steve Miller, L6σ Champion. The organizational placement and staffing of the Business Transformation Office broadcasted the priority the Commander gave to L6σ. Although Miller formally reported to the Director of Transformation, in fact, Col. Guinn went directly to Miller and Miller directly to Col. Guinn on all matters of L6σ. The direct line to the depot Commander became especially important when there was line-manager or supervisor resistance to a L6σ event

or when coordination among Directorates was required to implement a major change. Col. Guinn believed that he communicated his priority for L6σ by where he placed his Lean Champion in the organization, but more importantly, by the Champion’s reporting line. As one Director reported, “We all knew if Steve Miller or Bart Bartling and Ron Bercaw [Simpler consultants] had a problem, they could go right to the Commander.”

There were ten members on the Lean Core Team led by Lean Champion Miller. The majority of the members came from the Directorate of Maintenance – Methods and Standards Group, and for organizational purposes resided in that Directorate. Members were selected because they had dealt with shop-floor metrics, were quantitatively oriented, and could quickly learn L6σ tools. Being on the Lean Core Team was a full-time job. Among their duties were developing and facilitating L6σ events across the depot and training Letterkenny employees in the principles and tools of L6σ. Usually 3 or 4 members from the Lean Core Team were assigned to Value Stream Analysis and Rapid Improvement Teams.

Mobilization Goal #2: Create the Infrastructure. The groundwork for infrastructure began with the Business Transformation Office, the Lean Champion’s reporting line, and the full-

time Lean Core Team. But as Michael George reports, a failure factor under this goal is creating another silo and staffing it with people who have no connections with the real work going on in the organization. Lean teams are staff functions; the real work is being done by line managers and frontline employees. The challenge: line people are performing their jobs; they are working to meet production goals; and then the Lean team arrives to conduct a L6σ event – production slows or grinds to a halt; production people are pulled to help conduct the event; and, questions of priority are raised by supervisors. A classic clash between line and staff functions.

How did Letterkenny establish an infrastructure that resulted in collaboration between their Lean teams and the line organization?

The potential conflict was indirectly addressed by command group actions already discussed in the *Engagement* phase: line organization buy-in of mission, vision, objectives, strategy, and goals; the Mission Essential Tasks List (METL) matrix used for Directorate meetings; a shared burning platform; re-definition of performance goal metrics; and meeting agendas built on L6σ issues. Infrastructure, however, is more about the organization structure and interactions among people with different responsibilities and priorities. Two factors at Letterkenny broke down the silos and the conflict between line and staff: membership on L6σ event teams and Col. Guinn's management style.

The majority of L6σ events at Letterkenny were of two types: Value Stream Analyses (VSAs) and Rapid Improvement Events (RIEs). There were typically ten members on an event

team, with three or four members from the Lean Core Team. Three members were from the process being leaned (the sponsor) and three members were from other depot line or staff functions. A member of an event team might be the Director or middle manager whose area was being leaned. He or she would agree on their area's team members, who always included a union person, plus team members from outside the sponsor's area. As part of the VSA, future improvement projects would be identified. Then one or several possible improvement projects would be framed as RIEs. RIE team selection followed the same process as that for VSAs; however, RIE teams had one additional team member. Each team had assigned to it a so-called "barrier buster" – an individual in authority who could break down resistance to changes proposed by the RIE team. If the resistance really became strong or cut across multiple Directorate lines, then the ultimate barrier buster was the Commander himself.

An RIE at Letterkenny was a collaborative effort conducted over a four week period. The integrated team might even meet before the RIE's official four week start time (pre-RIE meetings) to determine what supplies and equipment would be needed for the event. On the opening day of the four week RIE period, Col. Guinn presented a motivational, goal oriented speech on "their" lean event. During the first three weeks of an event, the team worked together observing existing activities within a process, measuring current throughput, conducting time and motion-type studies, and planning changes on paper or cutouts. During this three week period, the RIE Team was a part-time assignment for team members; it became

a full-time job during the fourth week. The dollar cost of each team member's hours, as well supply and equipment costs, were assigned to the cost of the event. (These costs would later be matched against savings to calculate a net savings resulting from the event.) Three or four concurrent RIEs might be running over the same four week period.

RIE leadership positions and briefings were assigned to frontline personnel. Lean Core Team members and Directors on the RIE did not lead events or brief outcomes — they were member participants; frontline people who knew the existing process and afterward would sustain process changes were designated team leaders and briefers. Each week the RIE teams briefed their progress to the Commander, sponsors, other senior leaders, and Directors and/or their Deputies. Attendance was required for those directly in charge of a leaned area. Anyone else in the depot was welcome to attend any RIE briefing, which followed Col. Guinn's open communication – open door policy. If decisions had to be made, the leaders were in the room that could make the decision.

The first three weeks were preparation for the “fun” week – week four was implementation week and a full-time job for team members. Starting on Monday of week four and through Thursday morning, the RIE team was actually making the changes: painting and striping floors, placing tool shadow boxes, moving in new racks, and setting new equipment. Thursday afternoon the team did a site brief on the new changes; Friday morning was a final conference room out-briefing, after which token awards (e.g., Lean hats) were presented. Again, any senior leader, Director,

middle manager, or union officer was invited to attend the final briefing. Col. Guinn attended both the site and conference room briefings. RIE briefings were high priority meetings for Col. Guinn and the depot's command group. In order to attend one RIE briefing, Col. Guinn missed a headquarters meeting held by the commanding General of Letterkenny's command group. “Had I missed one of the briefings, it would have communicated to the team and everyone else at depot that I didn't think what they were doing was important. It also communicated to my commanding General our priorities at Letterkenny.”

The second factor that broke down silos at Letterkenny was the Commander himself. Col. Guinn led L6σ at Letterkenny by conviction and, as one of his Director's said, “tough love.” He was passionate about L6σ and what it could do to turn Letterkenny into a cost efficient depot. According to several frontline workers, Col. Guinn managed by talking to people up-and-down the line, by attending briefings and asking hard questions, and by walking the shop floors asking questions. He was there, and when he was there, he talked L6σ. But Col. Guinn was also a Commander in a military sense. One Director described it as “the Colonel's way or the highway.” One supervisor who admitted that he and “the Colonel knocked heads more than once over RIEs in his area,” said that his resistance ended when he took me for a walk and showed me the highway.” According to Letterkenny's L6σ Champion Miller, “Col. Guinn knew *right*... he could look at a process, an activity, a cell and know it wasn't right... and he wouldn't settle for anything less than *right*.” When another Director was asked how stove silos were

broken down at Letterkenny, he replied “simple – a strong Commander overcomes stove-pipes.”

And so it was at Letterkenny, infrastructure started on paper with vision-strategy-goals, and ended with the actions of a strong leader. In between were collaborative teams, meetings, events, and briefings. L6σ responsibility and accountability was constantly and consistently pushed to the frontline employees – to workers who knew the activities and processes – while the leadership never lost sight of the goals, quicker–cheaper–better, and the ultimate goal: meeting the needs of the customer. Within a year, the majority of Lean project suggestions came from the “floor” and not from supervisors or senior leadership. The groundwork was laid for imbedding L6σ in the culture of Letterkenny. As one senior leader remarked, “even if our next Commander came here with no knowledge of L6σ, he couldn’t have stopped the L6σ ball from rolling – it’s now our life here at Letterkenny.” (Postscript: Col. Guinn’s successor, Col. Robert Swenson, had no desire to stop L6σ and in fact has totally embraced L6σ for the depot.)

Mobilization Goal #3: Develop Training. Under this goal, Michael George presents guidelines for executive, process owner, and L6σ team member education and simulation programs. Under infrastructure and training goals, he also discusses capabilities necessary for green belts, black belts, master black belts, and champions. Formal training is a critical element of his L6σ deployment phases.

Formal training was not the case at Letterkenny. The constraint on formal training was time and budget.

Commanders were normally assigned to depots and installations for two years. The next BRAC was three years away. Col. Guinn decided that he didn’t have a year or even six months for formal training classes for his employees. Col. Guinn decided to combine training with participation in Lean events. His was the practical solution to the training goal: learn by doing. He set a goal that every employee participates in at least one Lean event, which would result in awareness, buy-in, and basic training in L6σ. As part of the personnel system at Letterkenny, everyone from senior leaders to the men and women on the shop floor (and especially, the men and women on the shop floor) were tracked for their participation in L6σ events. In many cases, people were assigned to L6σ projects because it was their turn to participate.

What did it mean to “learn by doing” at Letterkenny? As Dr. Gray said, “We learned L6σ by going to the University of Dirty Hands. We teamed up with first-line and second-line supervisors, with the people on the shop floor, and with the secretaries in the offices to form Lean Teams. Then we conducted L6σ events together... that’s how we learned L6σ at Letterkenny. And I’ll tell you something else; along with the basics of L6σ, we all learned to appreciate the other persons’ jobs and they better appreciated our jobs.”

Letterkenny’s University of Dirty Hands initially relied heavily on instructors from the Simpler Group. The instructors were the so-called Senseis who had been assigned to Letterkenny by the Simpler Group. Throughout Col. Guinn’s command at Letterkenny, a Simpler consultant was stationed at the depot for a minimum of one week per month, and as needed, several weeks per

month. Simpler consultants conducted training classes in L6σ, coached Value Stream Analyses and Rapid Improvement Events, and initially were the go-to people for dealing with L6σ issues at Letterkenny. Lean Champion Steve Miller and Simpler kicked off L6σ at Letterkenny; as the “participation” philosophy cascaded through time and the organization, others contributed to the L6σ education function. As time passed, Letterkenny built-up a core of resident experts – black and green belts without official certificates other than those awarded by the University of Dirty Hands.

Another element in the curriculum at the University of Dirty Hands was field trips. Col. Guinn had a staff member draw a circle with a one-hundred mile radius on a map around Letterkenny and then identify any business engaged in L6σ within that circle. These companies (two JLG plants, K-Mart distribution, Target distribution Harley Davidson, Mack/Volvo Truck, United Defense, Gabler Trucking and Logistics) were only a bus ride and a day away. Key influencers were invited to go on L6σ fieldtrips: senior leaders, Directors, Chiefs, first and second line supervisors, union leaders, and frontline employees. Who would turn down a day off work, a bus ride through the hills of Pennsylvania, and a free lunch? It was an event – the employees called it an “off-site.” But “off-sites” turned out to be a lot more than pleasure rides. People saw how things *could* be done; they saw that work areas didn’t have to be cluttered and disorganized; they saw flow and customer pull firsthand, they asked how can we do this or that in our department? The visits were discussed and debriefed on the bus ride back to Letterkenny. More discussions occurred

at meetings and on the shop floors once people were back at work. The early off-sites showed possibilities; they led to buy-in; they led to innovation; they led to excitement. After one off-site visit, one of the Directors remarked, “I became convinced that there was something to this thing called Lean Six Sigma and that it just might work at Letterkenny.” As early as one year later, the off-sites had a totally different impact: “we’re doing it better than they are... they could be doing this or that and have less WIP [Work-in-Process].” As the paint shop supervisor remembers his trip, “I saw for the first time that for a paint shop to be productive it didn’t have to be dirty with piles of stuff all over the place waiting to be painted. Now if you look at my shop, it’s so clean it doesn’t look like anything is happening. We *pull* from our customers so we don’t have work-in-process. You can eat off the floor in the paint shop, which is exactly what Col. Guinn said he wanted to do when we finished all our RIEs.”

The early off-sites were educational and motivational; the later trips were reinforcing and rewarding. During Col. Guinn’s three year command at Letterkenny, there were over 250 formal 4-week RIEs with 750 participants. Letterkenny’s leaders realized that the 4-week formal RIEs were not always necessary, so teams conducted hundreds of “mini-Kaizen” events after the first year of L6σ deployment. Building the L6σ knowledge base at Letterkenny took longer than it would have with formal training classes and a trained staff of black and green belts, but the “learning-by-doing” philosophy resulted in an almost across the board buy-in and culture change for L6σ. *Almost* across the board buy-in, but not *total* buy-in.

It took only a year for frontline employees to realize two facts of L6 σ : first, they knew their processes better than anyone else in the organization, even better than their first and second line supervisors; second, they had been empowered to suggest changes and make changes. They were part of an improvement process “process”... they knew what improvement was all about (quicker—cheaper—better for the benefit of the customer); they could initiate change proposals; and they experienced the satisfaction that comes with *doing it right*. (When James Womack toured Letterkenny in 2004, he left the guided tour, walked into an area, and told two shop employees that their area was one of the best examples of Lean that he had seen at the depot. Surprisingly, it was an area that they had leaned themselves – the RIE for their area was yet to be scheduled. They had participated in RIEs in other areas and initiated the changes in their area on their own.)

The push back at Letterkenny on L6 σ was not the frontline employees or the union; rather, when there was resistance to change, it came from middle managers. Previously there had been little emphasis on cost reduction – schedule acceleration – raising quality standards. As standards based on L6 σ were put in place, middle managers questioned their ability to meet or exceed those standards. Now they were managing by and being evaluated by metrics. Further, first and second line supervisors were used to employees coming to them to solve problems. Now employees were solving their own problems. Lean had been implemented at Letterkenny: customer pull, milk runs to pick-up work, flow, delivery to the next customer on the line. Frontline

employees punched-in, went to their work areas, didn’t wait around for work because the flow had already started – the flow of work now set the schedule (TAKT time) and not the workers or supervisors.

L6 σ seemed to threaten supervisors’ traditional roles on the factory floor. It became especially important to include supervisors on L6 σ teams and help them understand their new roles and measurement standards in a L6 σ environment. Open communication, Lean Core Team and consultant training, and involvement were the keys to overcoming middle management resistance at Letterkenny. Frontline employees, unions, and senior leaders bought into L6 σ during the first year; it took a second and third year for middle management buy-in and for managers to define new roles for themselves in a L6 σ culture. After a year or two of L6 σ , middle managers knew “right” and experienced exceeding standards, so their confidence and acceptance of L6 σ matched that of the rest of the organization.

Mobilization Goal #5: Select and Charter First Wave Projects. Initial project selection at Letterkenny was decided upon by Col. Guinn and his deputy Dr. Gray, but not without some disagreement. Dr. Gray suggested several small VSAs and RIEs to “test run L6 σ . If L6 σ events failed or got in the way of production, the negative impact would be minor.” Col. Guinn took the opposite position: “If L6 σ was going to have an impact on cost and efficiency, it needed to have a *big* impact.” So the first project was the PATRIOT missile system, starting with the PATRIOT launcher. Of

Letterkenny's \$121 million in revenues at the time, the PATRIOT recap program represented \$101 million. The Commander was looking down the road to the 2005 BRAC; he knew that cost and efficiency improvements had to be dramatic and the PATRIOT could produce dramatic cost reductions at the depot. Of course, L6σ could fail, but because Letterkenny was at the bottom of the depot list in terms of cost and efficiency, there was no place to go but up.

There were advantages to starting with the PATRIOT launcher. The customer had defined the performance requirement – recap 40 launcher systems per year until the year 2010. This meant a stable workload for the next eight years. The event teams could also start with the launcher and then branch out to the other system components: radar units, control station units, information and coordination units, communications relay units, antenna mast units, and power generating equipment. As shown in Table I, from October 2002 until 2005, 95 Lean events were performed on the total PATRIOT missile system, 58 events during the first year of L6σ deployment.

TABLE I

PATRIOT Component	# of VSAs	# of RIEs	# of 3-Ps
Launcher	2	39	3
AMG	1	13	0
Radar	2	23	1
ECS/ICC/CRG	1	2	0
Administrative (Non-MRO)	0	8	0
Total	6	85	4

Key: ICC – Information & Coordination
Central vehicle
ECS – Engagement Control Station
CRG – Communications Relay Group
AMG – Antenna Mast Group

Source: *Letterkenny Army Depot Shingo Prize Achievement Report*, 2005.

After the first VSA and follow-up RIEs, project selection was prioritized by TAKT time and bottlenecks in the work flow supporting the PATRIOT launcher. As noted earlier, after the first year most of proposals for RIEs came from frontline employees. The Lean Core Team decided what VSAs and RIEs were conducted, but the RIE proposals came from the shop floor.

As with any business transformation, early successes are critical to overall success. Col. Guinn's philosophy was "nothing breeds success like success." The positive results of every RIE were celebrated with rewards and depot-wide publicity. There were multiple award programs based on L6σ participation and successes: a Lean Tenure Incentive Program, Commander's Awards, and Lean Champion of the Year Awards. All awards and their recipients were

given depot-wide and community-wide publicity through internal newsletters and press releases. A most important award, and the one that kept everyone focused on the bottom-line, was the Net Operating Result (NOR) Award.

Col. Guinn had an agreement between management and the union that if the depot's Net Operating Result (NOR = Total Revenues minus Total Expenses) exceeded a pre-budgeted level, each civilian employee at the depot received an end-of-year bonus. Under Col. Guinn, the bonus increased in increments of \$200 as the pre-budgeted NOR level was exceeded in increments of a million dollars. In 2002, before L6σ was implemented, each employee at Letterkenny received a bonus of \$131. After L6σ, between the years 2003 and 2005, the maximum bonus allowed by the plan was paid to every civilian employee at Letterkenny — \$1000. Commenting on the importance of the NOR award to his employees, the Directorate of Maintenance said “yeah, the money is important but not as important as seeing four more launchers or 18 more HMMWV's going to the soldiers ... that's a feeling not even a \$1000 can buy.”

The sixth and final goal presented by Michael George poses the more important questions: how do you define success? How were Lean events defined as *successful* at Letterkenny?

Mobilization Goal #6: Reach Consensus on Common Metrics. The Commander established the nature of the metrics after his first briefing from the senior leaders and Directors: cost—schedule—quality, measured using hard numbers. With an eye for early

successes, success first came in the form of soft savings, quickly followed by hard savings. On the subject of soft savings, Dr. Gray said you could see benefits early and everywhere: “material wasn't being moved 9 miles and work-in-process disappeared.” The supervisor of the paint shop reported his area was processing 6 to 8 thousand parts a month prior to an RIE in his department; afterward the department was processing 20 thousand parts with fewer people, and was operating at only 70% of capacity. (Exhibit IV reproduces the press release on Leaning the paint shop, known as the “Black Hole,” prior to being Leaned.) According to the Director of Supply and Transportation, “the warehouse receiving area was backlogged 20 to 30 days before material was put away, plus lots of overtime, prior to our RIEs. After our RIEs the backlog was 4 days with no overtime.”

A change that resulted from many RIEs at Letterkenny, and one consistent with the tenets of L6σ, was installing new visual measures of departmental performance. Production boards and quality boards were carefully designed to show output, times, defects and, of course, targets. The boards were kept current so anyone at anytime could walk up to a department or area and see the hourly, daily, and weekly status of production. Letterkenny gave new meaning to the old adage “if you don't measure it, you won't control it;” their twist seemed to be “if you don't visually see it measured, you won't try to improve it.” Continuous improvement was as important as control at Letterkenny, especially because the workflow, not the employees, controlled the output. What the employees controlled was the continuous improvement of the production process.

The dominant metrics at Letterkenny were classified into Value Stream Performance measures, Customer Satisfaction and Quality measures, and On-time Delivery measures. In the final analysis, metrics at Letterkenny were designed to measure either customer satisfaction or dollar savings. Between L6 σ and the efforts of the Product Assurance Directorate, customer satisfaction quickly became a non-issue.

Initially the senior leaders at Letterkenny discovered that they were using faulty measures of quality. Col. Guinn instructed the Director of Quality Assurance to develop quality measures similar to those used by J.D. Power and Associates (targeted customer phone calls, written surveys, and site hand-off

visits). He also instituted joint quality acceptance inspections with the depot's largest customers, in which the customer's quality people and the depot's Directorate of Quality Assurance work together on the shop floor to set and enforce quality standards. The goal: quality levels equaling or exceeding those set by Toyota.

As a result of the new quality standards and programs, the out-the-door defect rate fell to zero and customer satisfaction surveys rose to 100% satisfied ratings. That left the on-going goals of increasing productivity and driving costs out of production and administrative processes. Letterkenny's results will be reported in the next section on *Performance and Control*.

Discussion Issues – The Case

The commander at Letterkenny established a Business Transformation Office, which included the Lean Champion. The Lean Champion formally reported to the Director of the Business Transformation Office rather than to the depot commander. What would have been the advantages, if any, of establishing a L6 σ Office comprised of Lean Core Team members, headed by the Lean Champion, with a direct reporting line to the commander?

The commander deployed L6 σ first to the biggest revenue generator on the depot. Discuss the advantages of starting small, especially when employees have minimal formalized training, learning from first-timer mistakes, and rolling out L6 σ to major areas of the depot after a year or two. Discuss the same question not in terms of the size of the project, but in terms of the number of Value Stream Analyses and Rapid Improvement Events, i.e., one or two a month versus 58 during the first year, as was true at Letterkenny.

Discussion Issues – Your Organization

What are the key performance measures in your organization? Who defines those measures and from whose perspective? How should target levels and target performance changes be set? What is the difference between baseline targets and benchmarked targets?

What are the qualifications for an effective Lean Champion? What should be the requirements for full-time L6 σ Core Team members? What actions should be taken to prevent your L6 σ Core Team from being another silo in your organization?

Letterkenny used an outside consultant to train managers and frontline workers in the principles and tools of L6 σ . Is this a viable alternative to formal training courses and certification in your organization? Why or why not?

During the case interviewing process, several Letterkenny employees said that four weeks was too long for an RIE. In the context of your organization, what should be the time line of a typical RIE? Define a specific event and draft a schedule of what should be done during each week (day) of the event timeline.

Premise: Outside consulting organizations and even outside Black Belts are often project oriented. They come into an organization, define a set of L6 σ projects, implement those projects, first time savings are realized, and then they leave. How does this approach to L6 σ deployment imbed a continuous improvement practice and culture into an organization? Compare this approach with Letterkenny's practice of *repeated* L6 σ events *pushed down* to frontline employees.

Michael George's final phase of L6σ deployment deals with post-L6σ changes in the organization: doing the same amount of work in less time; drifting away from priorities; inadequate tracking of results; achieving transformational change; and pitfalls and warning signs of L6σ deceleration. Many of George's pitfalls and warnings as applied to Letterkenny were covered in previous phases, so this section will focus on *Performance* and results rather than *Control*.

At Letterkenny, Value Stream *Performance* metrics measured productivity in terms of direct labor hours to produce output (e.g., direct labor hours to paint a launcher sub-assembly), personnel redeployment (e.g., number of people reassigned after the paint shop RIE), and factory floor space (e.g., number of square feet saved after a pull system was put in place and work-in-process was reduced to near zero). Factory floor space saved as a result of Lean events was measured in square feet. The space savings were significant: 1.2 acres or 20% of the PATRIOT interior real estate was freed-up and used to house the new business being generated by the Business Transformation Office. Although dollar savings from reduced floor space needs were not precisely measured, Col. Guinn believed the depot avoided over \$20 million in what would have been new construction costs for new products and services. The space savings were especially important because there was no Military Construction money to fit up the new business.

Dollar saving from direct labor hour reductions and personnel redeployment were diligently tracked by a specially designed cost tracking system, and then audited by the Directorate of Resource Management. The dollar savings were calculated NET of the cost of the L6σ event itself. Before a process or activity was selected for a RIE, an assessment was made of potential dollar savings. If the process or activity was selected for an event, the dollar cost of the process or activity was carefully measured before the event to establish a baseline, usually by a time and motion study. Prior to and during the event, the dollar cost of employees' time, supplies, new equipment – all costs for an event and for improvements – were recorded. After the event, the NET dollar savings due to the event (i.e., the baseline (prior) cost minus the cost of the event itself and new equipment minus the new cost of the process or activity) were calculated and extended over a reasonable time period. If Net Dollar Return was less than zero, the event was considered a failure. The measure of a *successful* event was a positive Net Dollar Return. As explained below, 60% of the audited savings were given back to the customer in the form of a “check” or as additional services at no charge, a practice unprecedented in the Army until Letterkenny's L6σ initiatives. 40% was retained by the depot and allocated to capital improvement projects.

But Letterkenny didn't end the benefits of L6σ with a customer check or free services: the Directorate of Resource Management revised

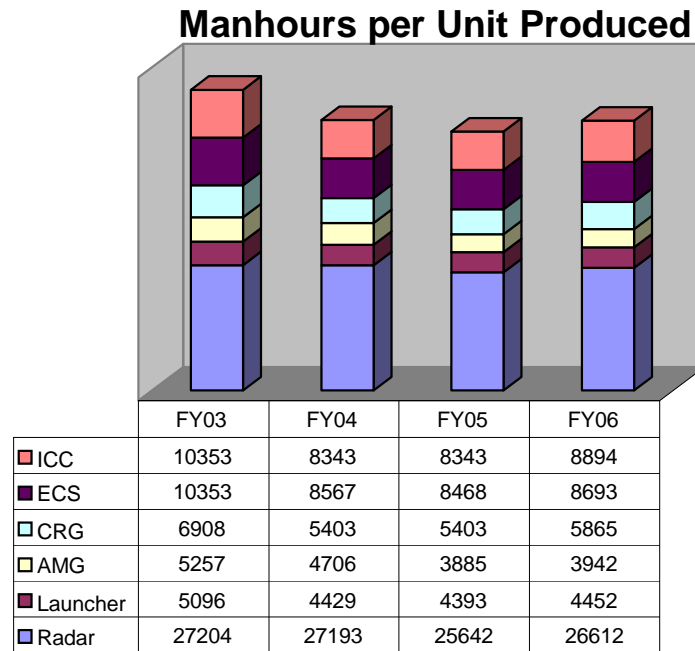
downward the required hours for future products and services based on the newly Leaned process. For example, if pre-Lean Letterkenny contracted for 10,000 direct labor hours to recap a launcher and post-Lean it took only 9,000 hours, then in the future they would contract for 9,000 hours to perform the recap work. As mentioned earlier, the cost savings calculated from the 1,000 direct labor hour reduction was passed back to the customer. As Letterkenny's Lean Champion said, "It was like shooting ourselves in the foot – we kept raising the bar." In a business context, Letterkenny was continually lowering their price and ultimately their revenue for producing the same product. Also, they now had fewer hours over which to allocate overhead expenses. In future years, they would have to find more savings or generate new business to earn the same Net Operating Results (NOR). And they did. Letterkenny's gross revenues grew from \$123.3 million in 2002 to \$456 million in 2006. New business came in the form of recapping

generators, building mobile kitchens and trailers, and modifying HMMWVs for the Army's Special Forces. "During the up tempo of war, there is no shortage of business."

Were there diminishing returns after the first and second L6 σ event in an area? Surprisingly, the opposite was true: savings were greater with the second and third RIE in an area. And there was also more to be Leaned – processes that hadn't been Leaned before. First-pass RIEs often focused more on the 6 S's of Lean; Sort, Straighten, Scrub, Safety, Standardize and Sustain. First pass events often had more of a "Clean" than a "Lean" approach. Second-pass would focus on lowering labor hours, eliminating "fat". Then the focus would shift to methods, removing excess steps, reducing wait times, improving processes.

Chart I shows the direct labor hour reduction for the PATRIOT missile system from 2003 to 2005.

Chart I



Key: ICC – Information & Coordination Central vehicle
 ECS – Engagement Control Station
 CRG – Communications Relay Group
 AMG – Antenna Mast Group

Source: *Letterkenny Army Depot Shingo Prize Achievement Report, 2005.*

Supporting the productivity improvements shown in Chart I were significant reductions in shop floor travel distances for sub-assemblies, components, and parts processing. L6σ events during the 2002–2005 period reduced travel distances by 1,155 miles, representing a 47% savings in distance traveled. Turn around time to recap a PATRIOT launcher (i.e., in and out the door) fell by 2½ months. But what were

the final dollar savings from productivity increases?

The program budget for PATRIOT recap fell from \$127.7 million in fiscal 2003 to \$101.6 million in 2005. The number of PATRIOT systems recapped remained unchanged over the period at 40 per year. The bottom line savings for the PATRIOT recap program were \$26.1 million on an annual basis for 2003, 2004 and 2005. This bottom line impact

triggered customer checks and depot employee bonuses. Most importantly, the customer – the Army Aviation and Missile Command – benefited from *cheaper* in the current year by receiving dollar savings checks and in future years by reduced cost per PATRIOT system

recapped. The ultimate customers – the Soldiers – received their equipment *quicker* and *better*. Mission accomplished!

Discussion Issues – The Case

What other L6 σ performance measures should have been tracked at Letterkenny? How should they have been visually displayed in work areas or publicized throughout the depot?

Discussion Issues – Your Organization

Recognizing that performance measures have two dimensions: level and change over time, what are measures of “quicker–cheaper–better” in your organization? How would you visually display these measures in work areas?

In an administrative/service organization, how do you translate “quicker–cheaper–better” into measurable numbers?

What reward systems for productivity improvements would you establish for customers? For employees?

Voice of the Customer

The first principle of L6 σ is “listen to the voice of the customer.” What adds value for the customer? What adds no value for the customer and, therefore, is waste? How are the benefits of productivity improvement passed on to the customer? In the competitive business world, productivity improvements are passed on to the customer in the form of lower prices. But a depot operates in the world of costs, not prices. So how was

Letterkenny going to pass productivity improvements back to its customers? The answer – through two mechanisms: lowering future costs for the same work and issuing customer checks. One offers a long-term benefit, the other an immediate one. Both extend L6 σ beyond listening to the voice of the customer to actually putting the savings into the customer’s pocket-book or doing additional work for the customer at no charge.

As discussed earlier, after L6σ events and the resulting labor hour savings, the total number of hours applied to future products and services was reduced to reflect actual direct labor hours. In an equation of budgeted-cost equaling unit cost times quantity, hourly labor cost was what it was – the actual hourly labor cost at Letterkenny – but the number of hours (quantity) was lowered year after year to reflect productivity improvements. The revenue to Letterkenny (unit labor cost times labor hours) per launcher was less year after year, but the cost to the Aviation and Missile Command, the Army, and the taxpayer also was less. The problem from Col. Guinn’s point-of-view was that it could take up to two years for central command to reflect Letterkenny’s productivity improvements with lower budgeted hours for a product or service. The Commander’s challenge: immediately giving back to the customer the saving from L6σ. He didn’t want to wait two years to show a customer the benefits from L6σ; he wanted to show them benefits in the current year. He needed immediate recognition, because of the burning platform of BRAC 2005 that confronted Letterkenny.

Col. Guinn presented the idea of a customer check to the Commander of the Army Materiel Command, Gen. Kern. Gen. Kern liked the idea but even with a *General’s* endorsement, Col. Guinn had to overcome several obstacles. First, giving *budgeted* money back to the customer had never been done in the Army. In fact, defining a higher command as a *customer* was novel. Second, returning budgeted monies violated the Army’s working capital fund regulations. So Col. Guinn and the senior leadership went to work to invent

a mechanism to give money back to the customer. Their mechanism avoided violating the law by passing the Army working capital fund and directly giving the customer an accounting credit.⁴ The first “check” in the amount of \$1.2 million was presented to the Army Aviation and Missile Command's Lower Tier Project Office-PATRIOT in September 2003. The Command “endorsed” the check back to Letterkenny, and then added another \$300K of Command monies to fund the recap of four additional Launchers. Prior to Leaning the PATRIOT system, there were only sufficient funds available to recap 36 missile systems, so now a complete Battalion of 40 missile systems could be recapped.

In keeping with the Commander’s philosophy of marketing L6σ successes to the depot and local community, ceremonial checks the size of a surf board were presented to the customer, photographed, and reported in the depot’s newsletters and bulletin boards, local newspapers and television, and in numerous Army publications. Most of the checks were “endorsed” and returned to Letterkenny for additional products and services at no charge. As of the end of 2005, \$4.7 million in customer checks had been issued to customers. In fact, Dr. Gray reported that he now receives calls from customers asking when they can expect their checks. A change in culture at Letterkenny and a change in customer expectations have been another benefit of L6σ.

⁴ The mechanism for returning budget dollars to a customer will be the subject of a future case by the authors.

Discussion Issues – The Case

The Army Aviation and Missile Command was both a supplier (PATRIOT missile systems to be recapped, components, parts) and a customer. What interdependencies and conflicts exist when a supplier and customer are the same entity?

Discussion Issues – Your Organization

Who are the customers in your organization? How do you go about finding their needs, wants, and priorities? How do you define your immediate customer's needs in terms of their customers' needs? Should you – and do you – factor in the needs of other stakeholders who are not customers?

How could you share your L6σ savings immediately with your customers? How could you share savings in the long-run? Even a more interesting question: why would you want to share savings, especially if it meant reducing future funds budgeted to your area or organization?

Conclusion

Michael George presents his L6σ deployment framework without a timeline. For Letterkenny, deploying L6σ did not linearly follow George's framework. Letterkenny passed through the *Readiness Assessment* phase within a month or two of Col. Guinn's arrival in July 2002, and then quickly moved to the *Engagement* and *Mobilization* phases. These two phases were well underway by October 2002. The sequence of actions taken by Col. Guinn and Letterkenny senior leadership during *Engagement* and *Mobilization* did not follow the script suggested by George. Col. Guinn's sense of urgency meant little time for formal training and certification. Also many of the elements of George's fourth phase – *Performance and Control* – were put in place in earlier phases. For example, the

Business Transformation Office was established and charged with finding new business even before the first L6σ event. Organization structure and reporting line changes were put in place during the *Engagement* phase – changes that laid the groundwork for a true business transformation at Letterkenny. The first L6σ event was conducted in September 2002 and then followed by 58 more events during next one-year period. The first customer check was presented in September 2003, just one year after that first event.

By the fall of 2003, one year after L6σ deployment, Letterkenny had passed through all of George's first three phases, and then it remained in the fourth phase. L6σ became the management philosophy and practice at Letterkenny. It was extended to other

recap programs, products, and services. It was taken from the factory floor to the administrative and office areas. It became part of the culture and a source of great pride at Letterkenny. It happened quickly, probably more quickly than it would have happened in most business enterprises, except those facing imminent bankruptcy. The Army's timeline for command changes, the war, and the 2005 BRAC forced a short timeline on L6σ deployment at Letterkenny.

In the spring of 2005, L6σ was used to set up and later Lean a HMMWV recap production line. A production line was completely new at Letterkenny because the physical product moved down a line, which wasn't true of the PATRIOT missile system components or the depot's other products. In the PATRIOT recap process, when parts

weren't available, recap continued with other components or subassemblies. If parts are unavailable in a production line setting, the line stops and workers had to move to other tasks, find non-revenue generating work, or in a worst case, stand idle. Letterkenny's production line couldn't stop; therefore, the parts flow and business partnerships were critical success factors to the success of Letterkenny's HMMWV recap process.

Why did the L6σ business transformation happen at Letterkenny and happen so quickly? The answer was summarized by Letterkenny's Lean Champion: "the Commander, senior leaders, union leaders, supervisors, and employees ... everyone was committed to being *better*, to *improvement*, and to doing it *right*."

Discussion Issues – The Case

Many factors led to the success of L6σ at Letterkenny. What were the three most critical success factors?

Knowing what you know about “leading change in organizations,” critically evaluate Col. Guinn’s change leadership and change management.

Discussion Issues – Your Organization

Would the same three critical success factors that you identified for Letterkenny apply to your organization? If a factor is different, explain WHY.

How does change leadership differ from change management?

How does true business transformation differ from simple change?

Should business transformation be top-down or bottom-up? Enterprise-wide or component specific? If business transformation is top-down and enterprise-wide, at what point should it transform to front-line workers and transition to a bottom-up strategy? Why should – or should not – that transition occur?

Epilogue

Colonel Robert Swenson assumed command of Letterkenny Army Depot on August 30, 2005. Col. Guinn turned over command to Col. Swenson with a whole set of new challenges. With the arrival of a new Secretary of the Army, new pressures will be exerted on Army facilities such as the Letterkenny Army Depot. There also will be another BRAC commission in the future and once again the threat of downsizing or closing Letterkenny. To support the Army's force transformation model, Secretary Francis J. Harvey stood-up a comprehensive, Army-wide Business Transformation Office with a mission to Lean the Army's business processes. When the Iraqi war winds down, supplemental war-time budgets will also wind down. There is also the possibility that the Army's base budget will be reduced as Congress re-allocates monies to domestic programs or to paying down the national debt. And once again, those depots and other Army facilities that are least efficient may stand to lose the most dollars or go out of existence. A post- Iraq funding drawdown may not be BRAC, but it will be BRAC'ish in nature.

Col. Swenson and all other army leaders have been charged by Secretary Harvey to make their operations more "lean." His goal is to free resources that can be better used to support the war-fighting side of the Army and to reduce taxpayer dollars supporting the military. Col. Swenson and other Army leaders are challenged to achieve dollar savings goals being set for them by the Army leadership. Saving dollars, managing within lower budgets, and promoting L6σ business practices are a new set of goals for all levels of the Army command structure.

The lessons learned from Letterkenny Army Depot can help all levels of Army military and civilian leadership deal with the new priorities of the Army. And, because the business side of the Army is not unlike any large corporation challenged with "leaning" its manufacturing and administrative processes, the lessons from Letterkenny Army Depot apply as well to business organizations. The lessons of the desire to survive, of business turnaround, of strong leadership, of motivating employees, and of deploying L6σ are the lessons that Letterkenny Army Depot taught business.

Exhibit I

LETTERKENNY ARMY DEPOT
ORGANIZATION CHART
2002

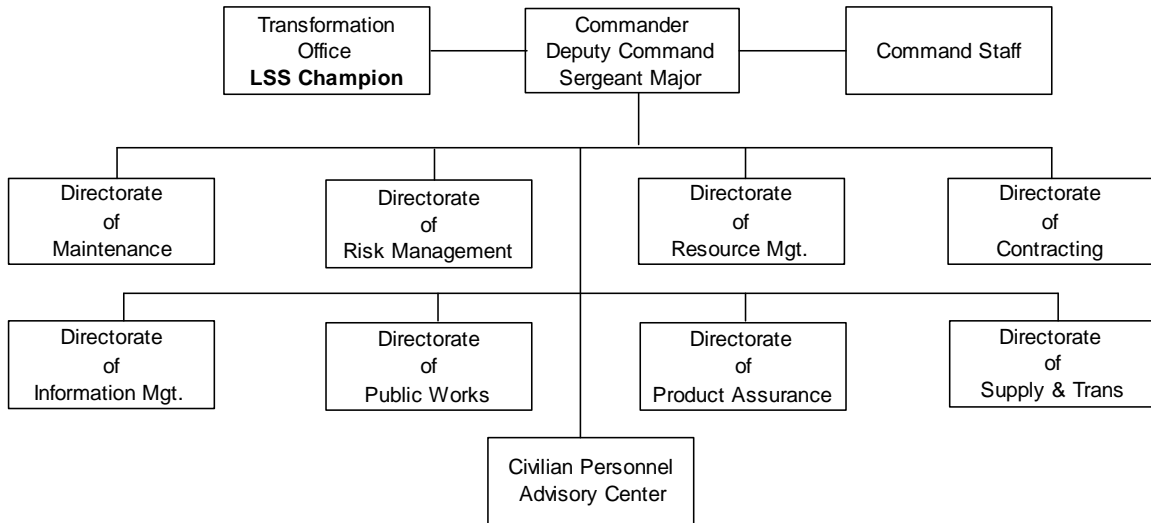


EXHIBIT II: Letterkenny Initiatives

MISSION

Sustain the operating forces by providing quality Air Defense and Tactical Missile Systems, Chemical and Biological Detection Systems, and associated equipment to Department of Defense customers and Foreign Allies.

VISION

World-class provider of logistical support capabilities for defense weapon systems and associated system/Soldier support equipment.

STRATEGIC QUALITY OBJECTIVES

The following Quality Objectives have been developed to provide the fundamental framework for ongoing business growth, success, and development and implementation of all initiatives. The Mission Essential Task List (METL) methodology is used to cascade objectives down through the organization.

SUPPORT ARMY TRANSFORMATION

Our support to Army Transformation is imperative. Relevance, readiness, and responsiveness are critical to the success of the Army as a whole. We will focus future growth initiatives on the sole and partnered support we can provide to existing and new/emerging Army Weapon Systems, Soldier Support Equipment and we will seek to support other Joint services that can benefit from our abilities. We will pursue process technology to recapitalize the depot. Additionally, with our employees being the greatest asset, we will expand workforce knowledge base and abilities through education, developmental job assignments, and technical skill growth.

SUSTAIN AND IMPROVE CURRENT DEPOT OPERATIONS

Satisfying our customers by meeting or exceeding our mission quality, cost, and schedule requirements are the foundation for completing our designated core and non-core workload. We are committed and press forward in our journey on continually improving the depot through the application of ISO 9000 quality principles. Our aim throughout the depot is to continually improve operations by reducing and eliminating non-value-added activities and functions, ensure relevant/pertinent tasks, and streamline processes to enhance effectiveness, efficiency and ensure affordability.

SPECIFIC COMMANDER GOALS

Specific Quality Objectives (Commander's Goals) are actions we must take to enhance our business growth and ensure satisfaction of current and future customers.

Source: *Letterkenny Army Depot Shingo Prize Achievement Report*, 2005.

EXHIBIT III: Mission Essential Task List (METL)

LEAD Strategic Business Plan Quality Objectives Matrix

SUPPORT ARMY TRANSFORMATION	SUSTAIN & IMPROVE DEPOT OPERATIONS	SPECIFIC COMMANDER OBJECTIVES	STRATEGIC QUALITY OBJECTIVES	DIRECTORATES & SPECIAL STAFFS	SUPPORTING DEPOT GOALS	DOM	DRM	DOIM	DPA	DOC	DRSK	DS&T	CPAC	DPW	COMMAND GROUP
•	•	•													
●	•	•	Develop Partnership Initiatives				NA				NA				NA
●	•	•	Recapitalize Depot										NA		NA
●	•	•	Train Workforce												
•	●	•	Quality												NA
•	●	•	Cost												NA
•	●	•	Delivery				NA				NA				NA
•	●	•	Increase Workload to 2.0M DLH					NA			NA				
•	●	•	Support Successful Production Start-up of All New Workload												
•	●	•	Clean up Depot												NA
•	●	•	100% Lean Participation by 30 July 05												

GREEN BLOCK INDICATES ACCEPTABLE PERFORMANCE TO OBJECTIVE

YELLOW BLOCK INDICATES OBJECTIVE REQUIRES IMPROVEMENT

RED BLOCK INDICATES UNACCEPTABLE PERFORMANCE TO OBJECTIVE

Key:

DOM = Directorate of Maintenance

DRM = Directorate of Resource Management

DOIM = Directorate of Information Management

DPA = Directorate of Product Assurance

DOC = Directorate of Contracting

DRSK = Directorate of Risk Management

DS&T = Directorate of Supply and Transportation

CPAC = Civilian Personnel Advisory Center

DPW = Directorate of Public Works

Source: *Letterkenny Army Depot Shingo Prize Achievement Report*, 2005.

EXHIBIT IV: Press Release

Department of Defense Best of Show Letterkenny Army Depot Eliminates Clean-Paint Bottleneck Using Lean Six Sigma

In late 2002 at the start of Lean Six Sigma (**L6σ**) Continuous Improvement Program (CIP) activities on the PATRIOT Air Defense Missile System, it quickly became evident that the biggest constraints or bottlenecks affecting Lean implementation were the commonly shared Directorate of Maintenance Clean, Blast, Brush Plating, Paint Strip, Metal Treatment, Paint Preparation and Paint support operations located in Bldg 370 - otherwise known as the "BLACK HOLE." These operations are a critical value-added aspect for PATRIOT as well as all other value streams to provide corrosion abatement and life-cycle extension of refurbished components. Prior to starting **L6σ** activities, about 8,000 parts per month were processed with supervisors typically having to continually expedite critical "got to have today" items. "BLACK HOLE" supervision desperately asked for additional manpower to accomplish missions - this was not an option. Depot Leadership decided to take a new approach by applying the Toyota Production System **L6σ** tools just being learned and applied with a good success on the PATRIOT Launcher system.

To focus intently on this bottleneck, a separate Value Stream Analysis was conducted during which it was recognized that **L6σ** activities limited to one particular value stream, such as just PATRIOT, would not enable desired results for PATRIOT or any other program. Ten Rapid Improvement (kaizen) Events and one Production Process Preparation (3-P) event were conducted starting in January 2003 and continued over the next 18 months. Although definitive savings were difficult to document at the time of the individual events, by the latter half of 2004 it had become evident that the series of events had provided some of the biggest paybacks by the general performance improvement for all programs with parts processed through the bottleneck. The processes were streamlined, wasteful operations were eliminated and a "Milk-Run" pull system was started. The "Milk-Run" pull system picks up and drops off from each of the 13 cost centers from around the Depot each day, allowing for a steady flow of parts that are pulled into the areas rather than being pushed as previously done.

The following specific improvements have been noted: flow time has decreased from weeks to just days, travel distance decreased by 92% in Paint Prep and 32% in Silk Screening, 1,566 sq ft of floor space has been freed up for other missions. Throughput and productivity significantly increased so that, during 2004 with the Operation Iraqi Freedom mission surge, parts volume raised to about 20,000 parts per month without having to add personnel. During 2005 three additional workers were hired as the parts volume rose to a high of 36,912 parts in March 2005, factoring in the added manpower productivity increased by 312%! Process quality has also improved to the point in March 2005 when zero rejects were recorded and, during the six month period of November 2003 through April 2005, only nine external rejects were recorded equating to a 99.993% quality rating. Bottom line: With a Team-of-Teams approach, proper application of **L6σ**, a lot of good hard work and supportive leadership, the "BLACK HOLE" bottleneck has been effectively eliminated!

**Link to the following web site to view a video about this CIP effort: [Best in Show Video](http://www.lead.army.mil/LEAN/LEAN_Clean_Plating_Production.wmv)
[<http://www.lead.army.mil/LEAN/LEAN_Clean_Plating_Production.wmv>](http://www.lead.army.mil/LEAN/LEAN_Clean_Plating_Production.wmv)**